U.S. Department of Transportation

Federal Aviation Administration

Advisory Circular

Subject: CHANGE 1 TO DESIGN STANDARDS FOR AN AIRCRAFT RESCUE AND FIREFIGHTING TRAINING FACILITY

Date: 1 1/24/98
Initiated by: AAS-100

AC No: 150/5220-17A
Change: 1

1. **PURPOSE.** This Change incorporates Chapter 4, Mobile ARFF Training Devices, which provides the standards, specifications, and recommendations for the design of mobile ARFF training devices.

PAGE CONTROL CHART

Remove Pages	Dated	Insert Pages	Dated
v	1/31/92	v through viii	11/24/98
		39-56	11/24/98

DAVID L. BENNETT
Director, Office of Airport Safety and Standards

TABLE OF CONTENTS (CONTINUED)

TABLE OF CONTENTS (CONTINUED)

TABLE OF CONTENTS (CONTINUED)

Figures/Tables **Page**

APPENDIX 1. DESIGN AND CONSTRUCTION PRACTICES FOR PETROLEUM FUEL STORAGE TANKS

Section 1. PETROLEUM FUEL TANKS

Section 2. VENTING SYSTEMS

Section 3. CATHODIC SYSTEMS

CHAPTER 4. MOBILE ARFF TRAINING DEVICES.

Section 1. MOBILE ARFF TRAINER (MAT) SYSTEM SAFETY.

60. General Design Criteria. The design objective for the MAT propane system shall be for the propane concentration levels within the fuselage not to exceed 5% of the lower explosive limit (LEL) of propane in air under normal, standby (passive) operating conditions, i.e., the facility is operational and no fire scenario is running. As a minimum, the MAT system shall contain discreet, identifiable safety features capable of performing in the manner described below.

61. Combustion Air Augmentation. A means shall be provided to ensure adequate combustion air is available to all burners to be operated, singularly or in combinations, inside the fuselage mock-up when interior fire scenario is specified. To be acceptable, the means used to augment the combustion air must be capable of keeping the concentration of propane that could build up inside the mock-up, during extinguishing agent application, to a level that is no higher than 10% of LEL.

62. Emergency Shutdown.

a. Automatic Shutdown. The automatic device must be capable of detecting emergency conditions and of automatically initiating shutdown when:

(1) The air temperature at 3 ft. (0.9m) above the floor exceeds 350 °F (177 "C) at the temperature measuring station,

(2) The propane concentration in the mock-up interior reaches 25% of the LEL,

(3) A safety hardware component failure is detected, or

(4) The electric power is lost.

b. **Manual Shutdown. A means** shall be provided in the MAT control center for the system operator to preempt (E-stop) the automatic system. The E-stop shall be capable of immediately shutting down all training fires when the operator, using a single, one-handed motion, activates a single button, switch, or lever.

c. Remote Shutdown. A network of E-stops shall be provided at all mock-up doorways and emergency exits, and on each fireplace local control pendant provided. The device shall:

(1) Permit any instructor, safety officer or student to immediately shut down all training fires by the activation of a single button, switch, or lever using only a single, one-handed motion, while wearing standard firefighter hand protection.

(2) Prevent the MAT from being restarted until the activated E-stop has been manually reset.

(3) Be hardwired to operate independently of the MAT control center.

63. Extinguishing Agent Detection.

a. A means shall be provided to ensure the appropriate burner response to extinguishing agent application at all fire scenarios whether operated singularly or in unison.

NOTE: ***Manual feedback systems are not acceptable because of the delay in gas control that the communications between the instructor and the control system operator adds to the operation.***

b. An acceptable extinguishing agent burner response device shall be capable of providing a consistent, realistic flame response in all training scenarios. It shall also be capable of keeping the build-up of propane inside the mock-up during extinguishing agent application to a level of 10% or less of the LEL when the combustion air augmentation device is working normally.

NOTE: ***Appropriate burner response to agent application will ensure a consistent, realistic flame response in training scenarios and will further serve to reduce any potential accumulation of unburned propane in the fire areas. It is especially important to prevent the hazardous build-up of propane for any interior fire scenarios. Automated agent detection sensors provide additional safety by reducing propane flow to the fire area as soon as agent is applied.***

64. Fail-safe Propane Control Valves. All valves used to control the flow of either vaporized or liquid propane from the propane supply tank shall be of a type designed to fail safe in the closed position. The valves may be either electric solenoid or pneumatically operated valves that close on loss of activating power. Acceptable valves shall have proof-of-closure switches to send a confirmation signal to the MAT control center when the valves are deactivated or on loss of power.

65. Internal Air Temperature Monitoring and Control. A means to monitor and control the temperature level within the mockup shall be provided. The following performance criteria are the minimum acceptable.

a. **Location.** A temperature monitoring sensor assembly shall be installed three feet (± .25 ft) (0.9 meter (± 8 cm)) above the passenger cabin floor and 8 feet (± .25 ft) (2.4 meters (± 8 cm)) from the nearest edge of the fire in the passenger cabin fire scenario.

b. **Temperature Limits.** The sensor shall be calibrated against a wet bulb/dry globe temperature (WBDGT) measurement during the on-site test and calibration of the MAT by the supplier.

(1) The lower safety limit shall be equivalent to a WBDGT of 200 °F (93 "C) at the sensor location.

(2) The upper limit shall be equivalent to a WBDGT of 350 °F (177 °C) at the sensor location.

c. Temperature Control. The system shall:

(1) Initiate cabin air augmentation, when interior fire scenario is specified, when the temperature at the sensor location exceeds the lower limit and permit the training to continue.

(2) Shut down all burners and smoke generators in the compartment if the temperature increases sufficiently to reach the upper safety limit.

(3) Continue the cabin air augmentation until the temperature is below the lower safety limit.

d. **Temperature Aierts.** A means shall be provided at the control center to monitor the cabin interior temperature and to visually and audibly alert the system operator when the upper temperature limit has been reached.

66. Hardware Malfunction. A safety hardware malfunction detection and reporting system shall be provided.

a. The detection system shall be capable of:

(1) Continuously checking for proper function of the critical safety components within the MAT system.

(2) Alerting the operator when a malfunction is detected.

(3) Initiating appropriate action if the failure affects system safety.

b. The hardware malfunction reporting system shall, in the event of excessive levels of propane, unsafe compartment temperatures, or failures of any safety component, send a warning signal to the MAT control center identifying the affected subsystem.

c. The MAT control system, depending upon the specific warning signal received, shall initiate purge ventilation, extinguish all flames and pilots, shutdown the propane gas supply, and display applicable alarms and warnings at the operator control center.

67. Pilot Flame Monitoring. The pilot flame for each fireplace, including the fuel-spill fire scenario, shall be monitored by a flame safeguard system.

a. The control unit shall be located in the associated burner control assembly and shall monitor the pilot flame associated with the burner to ensure that a pilot flame (positive ignition source) is present for the duration of each training exercise.

b. The pilot flame monitoring device shall, upon loss of the pilot flame monitoring signal, be capable of causing the propane fuel valves (vapor or liquid) serving the specific fireplace to automatically close. In addition, the device shall, under no circumstances, allow a propane burner fuel control valve to open if the presence of the associated pilot flame is not confirmed.

68. Pre-ventilation / Ventilation. The MAT fuselage mock-up shall be provided with a means to perform the following functions:

a. **Pre-ventilation.** A means shall be provided to ensure that pre-ventilation of the interior fuselage, when interior fire scenario is specified, must occur upon activation of the trainer at the beginning of every training day. Power and fuel for all fire generation equipment serving interior fuselage fireplaces shall be locked out until at least a 3-minute pre-ventilation cycle is completed or until detectable propane levels are below the 5% LEL background requirement.

b. **Control Ventilation.** Control ventilation mode shall provide a positive source of combustion air during a training tire scenario in the main cabin.

(1) If the propane concentrations within the fuselage reach 10% of LEL during a training exercise, the purge air shall be activated to increase air flow to the training fires to improve propane combustion, and training shall be permitted to continue.

(2) The purge air shall also be activated to help maintain safe temperature levels within the mockup if lower level temperature warning is detected, and training shall be permitted to continue.

c. Purge Ventilation, Emergency Mode. The purge ventilation system shall, as indicated above, be designed to work in concert with the control ventilation under normal operating conditions. It shall also be capable of responding to emergency conditions as follows:

(1) The interior temperature at the sensing station exceeds the high level limit.

(2) A training scenario is terminated by any of the manual E-stops.

(3) A training scenario is automatically terminated by a safety hardware malfunction.

(4) The propane vapor concentration monitoring system reports the concentration of propane has exceeded the pre-set upper limit of 25% of LEL.

The system shall be designed to remain at purge ventilation until the emergency condition is corrected and then to return to control ventilation mode in preparation for the next training exercise.

69. Propane Level Monitoring. The mock-up shall be equipped with a two-channel, drawn-sample, propane detector system to sample the interior fire area for any buildup of propane that could occur when extinguishing agent is applied to the propane-fueled training fire.

a. The propane detection system shall operate independently of the MAT control center and shall be capable of activating the ventilation/purge-air system as described above.

b. If the propane concentrations within the fuselage continue to rise during a training scenario, and reach 25% of LEL, the system shall close all gas supply valves and keep the purge ventilation system active for a minimum of 3 minutes or until the unburned propane level has been reduced below 10% of LEL, whichever is longer.

Section 2. AIRCRAFT MOCK-UP.

70. General Design Criteria.

a. The design objective is to provide a fire-hardened mock-up that fosters the perception of an aircraft. It shall be capable of presenting the trainee with the complications normally encountered in the suppression of a variety of realistic jet-fueled exterior fires, aircraft component fires, and typical interior aircraft tires if specified. The performance requirements for the specific scenarios are detailed in Section 7.

b. The aircraft mock-up shall be sized and proportioned to represent a commercial passenger aircraft typical of that found at the user's airport (see paragraph 71). The overall dimensions when configured for training may be different from the dimensions required for transporting the mock-up between training sites. The absolute requirement for practical, cost-effective transportability will by its nature limit the upper limit on actual size. Functional realism, not actual size, shall be the

governing factor in assessing acceptability of the MAT.

c. The mock-up, when deployed for training, shall present the student with approximately the same access constraints as found on commercial passenger aircraft typical of that found at the user's airport.

(1) The height of access doorways and hatches from ground or wing level shall approximate those on commercial passenger aircraft typical of that found at the user's airport.

(2) Wing height, engine locations, and wheel locations shall be multi-configurable to simulate both high and low wing aircraft.

(3) The operation of doors and hatches shall closely approximate those found on actual aircraft.

(4) At least three replaceable skin panel devices shall be provided. One located midway along the fuselage above the passenger cabin window line, one giving access to the cargo / luggage compartment, and one located along the passenger cabin wall. These panels shall be suitable to practice fuselage penetration for ventilation and remote, agent-penetrater application training.

(5) In addition to representative crew seating, the cockpit shall be equipped with simulated throttles and Tee controls and any other mock instrumentation needed to support the required scenarios.

d. Any purchaser-specific requirements relating to functional locations and dimensions of MAT components which differ significantly from the general requirements presented above or in paragraph 71 below should be clearly addressed in the purchaser's request for a proposal.

71. Dimensions of Operational Mock-up.

a. Table 4-l provides guidance as to an acceptable range for the dimensions of the mock-up in the fully deployed training configuration.

Table 4-1. Dimensions - Operational Mock-up

DESCRIPTION	Minimum	Maximum
Fuselage	**Feet**	**Feet**
Length	50	55
Height-ground to top of tail	13	20
Height-without tail	10.5	12
Width	7	9.5
Interior head height-center line	5.75	7
Aisle width	1.33	2
Doorways		
Height	5.5	6.5
Width	2.5	3.5
Bottom of door to ground	4	6
Over-wing Escape Hatch		
Height	3	3.75
Width	1.5	2.5
Bottom edge to ground	5.5	8
Weight of escape hatch	25 Lbs	50 Lbs
Wing		
Length-center line to wingtip, low wing	15	25
Height - low wing top to ground	4	6
Height - High wing top to ground	9	12
Weight of wing assembly	none	100 Lbs

b. Table 4-2 provides an acceptable range for the packaged dimensions which met US Department of Transportation (US DOT) guidelines for over-the-road transportation at the time of this writing. The supplier shall review the requirements as of anticipated delivery date and shall make the customer aware of any changes needed in the bid request to comply.

Table 4-2. Dimensions - Packaged Mock-up

DESCRIPTION	Minimum	Maximum
Fuselage in Transport Mode	**Feet**	**Feet**
Overall Length - Trailer & fuselage	50	55
Height-ground to highest point	None	12
Width at widest point	None	8.5
Undercarrage clearance - lowest point	1.5	None

c. No individual component of the MAT which requires moving, handling, or repositioning during the deployment, break-down, and repackaging process shall weigh in excess of 100 pounds (45 kg) unless some mechanical means to assist the operators is identified/provided.

NOTE: ***The weight limit imposed on any single component of the MAT is to allow two people to safely deploy the equipment without exceeding OSHA guidelines of a 50-pound weight limit per person lift.***

72. Fire Scenarios.

a. **Mandatory.**

(1) **Class B fire.** Fires involving aviation fuel typical of the following:

(a) For Index A & B airports, simulated fuel-spill fire on the ground. See paragraph 8 1 for the minimum fuel-spill burn area.

(b) Turbo-jet or turbo-prop engine, typical fuel leak fire in engine aft section. The device shall be equipped to provide a cascading (3-dimensional) running fuel fire.

(2) Class **A & D fire.** Typical of that encountered in a wheel/brake assembly.

b. **Optional- If Specified by the Purchaser.**

(1) Class A **fire.** Passenger and cargo compartment fires typical of those involving aircraft furnishings and passenger luggage.

(2) Class C **fire.** Flight deck, typical of a fire in an electrically-energized instrument panel.

(3) Class B **tire.** For Index C, D & E airports, simulated fuel-spill fire on the ground. See paragraph 81 for the minimum fuel-spill burn area.

73. to 79. RESERVED.

Section 3. FUEL-SPILL BURN AREA.

80. **General Design Criteria.**

a. The design objective of the fuel-spill burn area is to provide a portable ground fire of sufficient size and duration to present the trainee with a perceptibly realistic ground fire typical of those associated with an aircraft fuel spill.

b. The operational objective of the fuel-spill burn area is to provide airport ARFF and mutual aid personnel with a realistic scenario to practice responding to, gaining control of, and extinguishing a ground-based, aviation fuel-spill fire typical of ramp service mishaps and aircraft crashes.

81. Dimensions. The area of the fuel **spill** fire on the ground for all **MATs** may be calculated using **the** Discharge Rate Method (see Chapter 1, Section 3, Paragraph 5b.). However, the minimum area of **the** fuel-spill fire shall not be less than:

a. Index A, B Airports. 1300 sq.ft.

b. Index C, D, and E Airports. Since firefighters at Index C, D, & E airports are required to be trained every other year in a facility meeting the square footage requirements in chapter 1, **there** is no requirement for a minimum acceptable bum area for the mobile trainer for these airports. However, it is recommended that, if the MAT fuel-spill fire simulation is to be included, the minimum square footage be **no** less than 2600 sq. ft.

82. Performance Criteria. The fuel-spill burn areas specified above shall be divided into controllable segments.

a. The control segments shall be designed to support the weight of teams of three ARFF personnel (assume average weight of each individual to be 190 lb. (87 kg)) plus full protective gear as they walk across the surface with a charged hand line.

b. The segments shall be sized, configured, and operated in a manner that will present a realistic visual impression to firefighters approaching the scene and for a realistic response of the **fire** to agent application from hand lines or **ARFF** vehicle **turrets.**

c. The fire presented within the fuel-spill burn area (when totally involved) shall cover at least 95% of the surface of the burn area. When configurations other than the entire area are used, 92% of the surface area represented by the active segments shall be covered with fire.

d. The control segments which make-up **the** bum area, the control valve assemblies which control

propane flow to the individual segments, and the pilot ignition system used to ignite the fuel-spill bum area shall be designed for convenient set-up, break-down, and repackaging by instructors.

83. to 89. RESERVED.

Section 4. THE MAT OPERATOR CONTROL CENTER.

90. Human Factors.

a. **Environmental Cdntrol. The purpose** of the MAT operator control center is to provide an environmentally controlled operating environment which minimizes the distractions to the operator of the MAT. The control center space shall be designed to house the control system components. These components shall have a Heating, Ventilation, and Air Conditioning (HVAC) controlled environment to maximize usefulness and minimize maintenance costs to the equipment.

b. **Communications.** The control center shall be radio-equipped in a manner that will allow the system operator to maintain audio contact with an instructor and a safety officer when either or both are inside the fuselage, outside the fuselage, or at the fuel-spill burn area at any given time.

c. **Emergency Stops.** The control center shall be equipped with a manual emergency shut-down device (E-stops) for each fire scenario. Upon activation of any of the emergency stops, all flame must be extinguished within ten seconds.

d. **Operational Warnings.** The control system shail be configured so that the safety systems defined in Section 1 above will, if an unsafe condition occurs, override the operation of the control center, arid cause rapid shut down of fuel supply and initiate ventilation of the mock-up.

e. Performance Documentation. A means to record training scenarios, student rosters, and performance logs, and to generate copies of the logs shall be provided for the system operator in the control center.

f. **Sizing.** The maximum practical size (height, width, length, and weight) shall be governed by the limits imposed by the need for the control center to be transportable. Given this limitation, the decision criteria for the physical dimensions of and the amenities provided in the control center shall be based on the following considerations:

(1) The operator will be working in this area for long periods of time and is the primary person tasked with protecting the safety of personnel in and around the trainer. Therefore, the working environment shall be relatively comfortable (with respect to temperature and humidity) and conducive to concentration (with respect to noise and outside distractions) on the procedures associated with the operation of the MAT.

(2) Space shall be provided to temporarily accommodate at least one additional person (either a student dressed for training or an observer dressed in street clothes) without interfering with the operator while the MAT is active.

(3) The control center shall also provide adequate space to allow the operator to perform nominal clerical work such as filling out reports and evaluating student performance while the MAT is inactive.

(4) Additional space shall be provided for the storage of radio control system components, a battery recharging capability, and the stowage of specialized tools and spare parts for maintenance of the MAT. Table 4-3 defines the acceptable range for the physical characteristics of the control center.

Table 4-3. Dimensions - Control Center		
DESCRIPTION	Minimum	Maximum
Exterior Dimensions	Feet	Ret
Length	6	7
Height-ground to top in transport mode	None	12.5
Width	5.5	6
Doorways		
Height	6.33	6.75
Width	2.5	3.25
Number of full size doors	1	1
Emergency Escape	Hatch	
Height	2.75	None
Width	2.75	None
Bottom edge to ground / escape route	None	5
Windows		
Degrees of unobstructed visibility	180	None
Height - sill to floor	None	3
Height – glass area	3.5	None
Width	3	None
Interior Dimensions		
Length	5.5	6.5
Height	7	7.5
Width	5	5.5

g. **Visibility.** The control center shall be so arranged and provided with sufficient window area to allow the operator, while operating the control system, a 180" view of the exterior. Depending on the specific site set-up, that view should allow oversight of the active, exterior side of the fuselage, the fuel-spill bum area and the propane storage and delivery system.

91. Performance Criteria. The operational characteristics of the MAT shall be designed to **ensure** that the safety of personnel operating in and around the device is of highest priority.

a. **Control System.** The MAT control system shall be designed to provide consistent training from one student to the next.

(1) The control system shall permit the fire control variables associated with each of the training fire scenarios to be configured by the system operator so as to repeat a given training scenario, and that scenario must reliably react to similar student firefighting actions in the same manner.

(2) The MAT control system shall have the capability to record student participation in a given training scenario and the level of performance achieved, and to permit recall of that data.

(3) The MAT control system shall have an automatic control feedback system which measures agent application rate and provides control of the fire, including the increase/reduction of the fire based on fuefighter performance. Each fire scenario shall have sufficient thermo heat sensor positions to detect the agent application across the full coverage area of the fire.

(4) The MAT automatic control system shall provide for setup and calibration and continuous monitoring and troubleshooting of all safety systems. It shall provide for auto-shutdown under any conditions warranting such action.

(5) The MAT automatic control system shall be capable of recording and providing hard copies of setup and calibration and training events.

b. **Operator's Station.** Access to the operator control station shall be protected by a reliable security device.

(1) The control station shall be configured to allow the operator to rapidly configure, reconfigure, and run the training scenarios.

(2) It shall provide the operator with a means to identify potential problems associated with the various training scenarios by warnings and alarms with both visual and audible cues.

(3) The operator's station shall be provided with a means to facilitate subsystem testing, maintenance, and trouble-shooting. Built in diagnostics shall be provided to assist the operator in identifying and isolating items in the system which may require calibration and/or replacement.

(4) A means shall be provided for the operator to log the individual students participating in a given fire scenario and the student's actual performance. The instructor(s) and the system operator shall be permitted to add comments to the log relative to the performance of individual students.

92. to 99. RESERVED.

Section 5. FUEL SYSTEM REQUIREMENTS.

100. General Design Criteria.

a. The primary design objective is to provide a propane supply and distribution system that ensures all interior (enclosed compartment) fire scenarios can only be supplied with vaporized propane fuel.

b. The functional objective of the simulator fuel system shall be to provide the ground tire scenario and other exterior aircraft component fire simulations on and around the mock-up (e.g., engine, brake, and wheel fires) with either or both vaporized or liquid propane as may be required to present a realistic, controllable fire scene.

101. Compliance with Standards.

a. **Supply.** The fuel supply system is to be designed to meet NFPA 54, ***National Fuel Gas Code,*** and NFPA ***58, Standard for LP Gas Storage and Use.***

b. **Propane Hoses, Piping, Fittings, and Couplings.** The propane hoses, piping, fittings, and couplings shall conform to the guidelines established in NFPA 54 and NFPA 58.

NOTE: ***It may, in some cases, be necessary for the MAT to comply with state or local codes regarding the storage and use of propane in addition to the NFPA references cited above.***

102. Performance Criteria.

a. **Supply.** If a propane storage tank is to be transported, it shall be in an approved, transportable, self-contained system. The size of this storage facility shall be adequate to support a typical 8-hour training day. It shall have a fill connection that is compatible with commercial propane fuel service equipment.

(1) The vapor supply system shall provide adequate pressure and volume to allow any three fuselage-based fireplaces and the fuel-spill bum area pilot ignition system to function at the same time.

(2) The liquid propane supply system shall be designed to provide for a fully functional fuel-spill bum area operation in conjunction with the simultaneous operation of up to three fuselage fireplaces with no degradation of system performance as it relates to realistic fire scenarios.

b. **Propane Hoses, Piping, Fittings, and Couplings.**

(1) The system shall be designed to take advantage of rated, quick-disconnect fittings and couplings wherever possible.

(2) The fittings and couplings for the liquid supply system and vapor supply system shall be marked, coded, or otherwise identified to prevent accidental connection of the liquid supply to vapor burners and pilots.

(3) The hoses, piping, fittings and couplings shall be of sufficient diameter to permit adequate flow of fuel to fire scenarios to meet the operating requirements for a visually realistic fire scenario.

103. to 109. RESERVED.

Section 6. ELECTRICAL SYSTEM REQUIREMENTS.

110. General Design Criteria. The design objective of the electrical system is to provide a power source and a power distribution grid for the MAT that will permit it to operate at any location without the need to connect to any outside electrical power supply.

111. Compliance with Standards.

a. **Power Supply.** The unit shall be a commercially available unit which complies with all existing engine and generator standards for outdoor industrial applications.

b. Electrical Wires, Cables, and Connectors. All wires, cables, and connectors shall comply with the National Electric Code with regards to voltage and current carrying capacity, insulation, jacketing, and protection. The jacketing and protection of all interconnect cabling shall be appropriate for current carrying capacity. In addition, the jacketing and protection of all interconnect cabling shall be appropriate for the aggressive nature of this application.

112. Performance Criteria.

a. **Electrical Power Supply.** The generator shah operate on commercial, automotive grade diesel fuel. The fuel tank shall be adequate to provide full power to the MAT for up to ten hours of continuous operation. In addition, the generator shall have sufficient capacity to support the "as-built" MAT and to have a spare load capacity of approximately 25 %.

b. **Electrical Wiring, Cabling, and Connections.**

(1) All electrical connections between the various components, the power supply, and control systems shall be prominently identified, marked, and polarized in a manner that will prevent improper connection. Whenever possible, quick connect/disconnect electrical connectors shall be used.

(2) Outdoor rated, Ground Fault Interrupted (GFI) convenience receptacles (duplex) shall be provided. The inside of the control center shall be provided with sufficient receptacles to support the control system requirements without the use of extension cords. In addition, at least one GFI receptacle shall be on the outside of the control center and at least one GFI receptacle at each end of the fuselage mock-up. These shall be sized to allow the operation of common electrical power tools.

(3) All wiring within the system shall be clearly identified by color coding or some other acceptable means of circuit identification. A system wiring diagram shall be provided as part of the deliverable MAT documentation. It shall clearly show the means of identification used in the completed MAT.

113. to 119. RESERVED.

Section 7. INTEGRATED SIMULATOR SYSTEMS REQUIREMENTS.

120. General Design Criteria. The overall design objective of the MAT is to provide a safe training environment that is also visually and tactually realistic, repeatable, and able to be documented. The functional design objective is to provide a means of control for all of the fire scenarios that will ensure achieving the design objective.

121. Control System.

a. **Operator Control Station.** A means shall be provided to run each fireplace (except interior fuselage scenarios) from either the operator control station with radio communications among the operator, one or more instructors, and a safety officer or by an instructor from a local control pendant. In the latter case, the system operator shall be able to monitor performance and activate an E-stop for each fire scenario from the operator control station.

(1) Each scenario shall have specific fire behavior variables associated with the characteristics of the fire being simulated and operational features associated with the extinguishing of that particular type of fire.

(2) A means shall be provided to configure the various fireplace variables from the operator control station. Access to the control system configuration, operation, and maintenance functions shall be through a reliable security device.

(3) A means shall be provided to ensure that the variables are configured prior to the start of a training scenario. Once the scenario has begun, the.variables shall be locked and cannot be changed until after the completion of the training exercise.

(4) A means shall be provided to ensure that the variable settings used for a given training exercise become a part of the student's performance log.

b. **Pendant Control Stations.** A local control pendant shall be provided for each, interior training fire scenario (when specified) on the fuselage mock-up. The pendants shall allow an instructor to activate the interior fuselage training scenarios from inside the fuselage mock-up.

(1) Prewired stations located near each of the other fire scenarios shall be provided with quick connect fittings to facilitate connecting a local control pendant. All pendants provided shall have sufficient, but not less than ten feet, control cable to allow the instructor to observe student performance without interfering with student access to the scenario.

(2) All pendants provided shall be equipped with an emergency shut-down switch which shuts-off all propane supply to the trainer, and, for interior fire scenarios, automatically ventilates the fuselage mock-up.

(3) Other controls on the pendants shall include smoke emit, pilot enable, fire start, and (for interior fires only) ventilation enable. An indicator shall also be provided to inform the instructor that the control system is detecting agent application.

(4) An unused switch and sufficient unused **control:** wires shall be provided to allow the connection of an optional fireplace function which may be added *to* the MAT at a later date.

c. Remote E-stops. A means shall be provided to comply with the requirement for E-stops given in each of the following paragraphs:

Section	Paragraph	Subparagraph
1.	62.	c.
4.	90.	c.
7	121.	a. & b.(2)

d. General Control Procedures. The method provided to activate each fire scenario shall be designed and constructed to operate in a logical and predictable manner. They shall, in general, operate using the following sequence of events:

(1) The selected fire scenario must always be started by first initializing the pilot flame. Under no circumstances shall any valve which controls the flow of propane to a fireplace be able to be opened without the confirmed presence of a pilot flame.

(2) Once the pilot is confirmed, the valves controlling the flow of vaporized or liquid propane shall be opened by a separate "fire control" command from the control station (or a local control pendant as applicable) and allow fuel flow to the fireplace where the vapors shall be ignited by the confirmed pilot.

122. Exterior Aircraft Fire Incident Scenarios.

a. **Ground Fuel Spill.** The purpose of this scenario is to present realistic and challenging exercises upon which both new and experienced firefighters can develop a level of confidence and proficiency necessary for them to position themselves properly, to utilize proper agent application techniques, to manage limited extinguishing agent resources to fight the fire, and to create a safe pathway to the aircraft mock-up.

(1) **The** fuel-spill burn area shall be sized as defined in Section 3, paragraph 8 1.

(2) It shall be designed and constructed to operate in a manner that will provide ARFF personnel with exposure to a radiant heat load approximating that commonly associated with aviation fuel-spill fires of similar size.

(3) It shall also be designed and constructed to-operate in a manner that will ensure that responding firefighters get a visual perception that they are approaching a fire size typical of a commercial passenger aircraft fuel-spill fire.

(4) The design and construction of the controls for this scenario shall provide the operator with the means to define the size, shape (within the predefined grid of control segments), and the extinguishing difficulty level of the fire scenario to be presented for each training exercise.

(5) A means of control shall be provided to ensure that once the operator has selected the variable settings, the fire scenario can only be ignited from the operator control station.

(6) Once ignited, the ground fire shall then begin to grow by spreading from segment to

segment within the fuel-spill burn area. The fire shall spread from one segment to the next only after presence of flame on the adjoining segment is detected. The fire shall grow in this manner until all of the preselected segments are covered in fire. The flame height on the fuel-spill fire area shall be proportional to the number of burning segments.

(7) Sensors within the individual control segments shall provide feedback to the control system. **Based** upon the predetermined settings of the extinguishing difficulty level, the fire shall respond to proper agent application by receding in a realistic manner and eventually extinguishing.

(8) If sensors within the individual control segments detect that the application of water is stopped too early (based on the preselected level of soak time), the fire shall be allowed to rekindle.

(9) A means shall be provided to ensure that once a control segment has been extinguished (proper soak time per preselected variable) it shall remain inactive until the completion of a training scenario.

NOTE: ***Although this inability to reflash after complete extinguishing is not an entirely realistic fire response situation, this safety feature is required to eliminate a potentially unsafe condition, i.e., a control segment becoming alive while firefighters are standing on it.***

b. **Engine Nacelle Fires. The** purpose of this scenario is to present a realistic training exercise to teach the proper fire area approach and to develop the agent application techniques needed to achieve safe engine fire extinguishing. The MAT shall be designed and constructed to provide students the opportunity to deal with a turbo prop engine and/or a jet engine.

(1) The MAT shall be designed and constructed to provide the following mounting locations for an engine fire scenario:

(i) One above, on, or in a low-wing fuselage configuration;

(ii) One below the wing on a **high**-wing type aircraft; and

(iii) One on the side of the rear fuselage area (typical DC-9) of a low-wing type fuselage.

(2) The design and construction of the controls for this scenario shall provide the operator with the means to define both the complexity (engine off or engine running) and the level of extinguishing difficulty (static internal fuel fire or **fire** with **flowing/3-dimensional** fuel fire running to the ground) of the tire scenario to be presented for each training exercise.

(3) The engine-off internal fires shall be located in the exhaust area of the engine and give the appearance of a small fuel leak fire.

(4) The engine-running fire scenario shall have the complication of a flaming exhaust plume added to the engine-off scenario. This scenario shall require that action be taken to shut down the engine fuel supply, i.e., close the mock throttle from the flight deck before extinguishing can be accomplished.

(5) A fireplace element that gives the appearance of a **fire** with, fuel flowing out of the engine **(3-dimensional** fuel fire) and running to the ground shall be provided as a selection to increase level of difficulty for the engine fire scenarios.

(6) The engine-off and engine-on fires shall be designed and constructed to respond to the appropriate direct application of agent (water) to the hot exhaust area or to agent applied through an access panel located on the side of the engine mock-up. When the 3-dimensional fuel fire element is active, the design shall provide for a means to keep the basic engine fire burning until the 3-dimensional fire has been extinguished.

(7) Once the operator has selected the variable settings from the control station, the means of control for this scenario shall permit pilot and fire initiation by either the operator from the control station or by an instructor from the local control **pendent** near the engine on the fuselage mock-up.

(8) A means shall be provided to ensure that the fire (after being ignited by the pilot) will then grow to the flame height appropriate for the level of difficulty selected, e.g., engine exhaust area, the engine exhaust with exhaust fire plume, and

either of the above with the 3-dimensional fuel flow complication added.

(9) A means shall be provided so that smoke can be emitted from the engine exhaust area at any time. It shall be operated independently of the fire.

(10) Sensors within the engine fireplace shall provide feedback to the control system. Based upon the predetermined settings of the extinguishing difficulty level, the fire shall respond to proper agent application by receding in a realistic manner and eventually extinguish.

(11) If sensors within the engine or the 3-dimensional fireplace detect that the application of water is stopped too early (based on the preselected soak time) the fire shall be permitted to rekindle.

c. **Hot Brake/Wheel Fire. The** purpose of this scenario is to provide students the opportunity to deal with the hazardous conditions associated with overheated brakes. The fireplace shall be designed and fabricated to present a realistic training exercise to teach the proper fire area approach and to develop the agent application techniques needed to achieve safe wheel and brake fire extinguishing.

(1) The MAT shall be designed and constructed so that the wheel/brake fire scenario can be located underneath the wing, in the low-wing configuration and along side the fuselage in the high-wing configuration. The fire and smoke emission area shall be located between the dual wheels of a mockup landing gear assembly.

(2) A means shall be provided for this fire scenario to operate in either a smoke only or a fire and smoke mode.

(3) The design and construction of the controls for this scenario shall provide the operator with the means to define both the intensity (smoke only or smoke and fire) and the level of extinguishing difficulty (short soak or long soak) of the fire scenario to be presented for each training exercise. The fires shall respond to the direct application of water fog to the hot brake area.

(4) A means shall be provided to ensure that the wheel /brake fire will grow within the brake area to the flame height appropriate for the level of difficulty selected, e.g., short soak or long soak.

(5) Sensors within the fireplace shall provide feedback to the control system. Based upon the predetermined settings of the extinguishing difficulty, the fire and/or smoke shall respond to proper agent application by receding in a realistic manner and eventually extinguish.

(6) A means shall be provided for the on-site instructor to activate a device that will simulate the explosive, pressure-releasing sounds of a wheel safety-plug blow-out .

(7) If sensors within the fireplace detect that the application of water is stopped too early (based on the preselected level of difficulty), the fire shall be permitted to rekindle.

d. **3-Dimensional Running Fuel Fire.** This fire scenario shall be incorporated into the engine fire scenarios as described above.

123. Interior Aircraft Fire Scenarios (Optional).

a. **Passenger Compartment. The** purpose of this scenario is to provide students a safe opportunity to deal with the hazardous conditions associated with gaining entry into the limited space typical of a commercial passenger aircraft, maneuvering hand lines under low-visibility in a congested space, and a realistic Class A fire typical of that produced by the interior furnishings of an aircraft.

(1) The fireplace shall be designed and fabricated to give the perception of being a main passenger compartment fire and shall be designed to provide control of the following variables: extinguishing difficulty, flame growth rate, maximum flame height, soaking time, and visibility. It shall be possible to emit smoke into the fuselage at any time and it shall function independently of the fire.

(2) After the scenario variables have been selected by the system operator, the interior cabin fire scenario shall only be capable of initiation by the instructor from the local control pendent located inside the fuselage mock-up.

(3) The fireplace shall be designed and constructed to respond to water spray from either a direct hose attack or as applied by a penetrating nozzle through the skin penetration area.

(4) A means shall be provided to ensure that the interior cabin fire will grow at the predetermined rate and to the predetermined flame height in the main passenger compartment. The fire shall cover approximately 1/4 of the length of the interior of the fuselage in flames when the maximum flame height setting has been selected. Flame height shall reach at least the top of the luggage rack.

(5) Sensors within the fireplace shall provide feedback to the control system. Based upon the predetermined settings of the extinguishing difficulty, the fire and/or smoke shall respond to proper agent application by receding in a realistic manner and eventually extinguish.

(6) If sensors within the fireplace detect that the application of water is stopped too early (based on the preselected soak time) the fire shall be permitted to rekindle.

b. **Flight deck.** The purpose of this scenario is to provide students a safe opportunity to deal with the hazardous conditions associated with maneuvering hand lines and applying extinguishing agent under low-visibility, congested conditions, and to deal with a realistic Class C fire.

(1) The fireplace shall be designed and fabricated to give the perception of being an instrument panel fire in the flight deck compartment and shall be designed to provide control of the following variables: extinguishing difficulty, flame growth rate, maximum flame height, soaking time, and visibility. It shall be possible to emit smoke into the flight deck at any time, independently of the fire.

(2) After the scenario variables have been selected by the operator, the flight deck fire scenario shall only be capable of initiation by the instructor from a local control pendent located inside the fuselage mock-up.

(3) A means shall be provided to ensure that the instrument panel fire will grow at the predetermined rate and to the predetermined flame height in the flight deck compartment.

(4) The fireplace shall be designed and constructed to respond to water spray only after action has been taken to "turn off' electrical power to the instrument panel. If agent is applied prior to the power disconnect action, an alarm shall sound to highlight the improper technique and the fire shall be allowed to grow according to the preset variables.

(5) Sensors within the fireplace shall provide feedback to the control system. Based upon the predetermined extinguishing difficulty settings, the fire and/or smoke shall respond to proper agent application by receding in a realistic manner and eventually extinguish.

(6) If sensors within the fireplace detect that the application of water is stopped too early (based on the preselected soak time) the fire shall be permitted to rekindle

c. **Cargo compartment. The purpose** of this scenario is to provide students a safe opportunity to deal with the hazardous conditions associated with gaining access to the cramped space typical of a commercial passenger aircraft cargo / luggage stowage area, maneuvering hand lines under low-visibility, congested condition, and to deal with a realistic fire involving packaged Class A materials typical of airline passenger luggage and air freight.

(1) The fireplace shall be designed and fabricated to give the perception of being a cargo / luggage compartment fire and shall be designed to provide control of the following variables: extinguishing difficulty, flame growth rate, maximum flame height, soaking time, and visibility. It shall be possible to emit smoke into the compartment at any time, independently of the fire.

(2) After the scenario variables have been selected by the operator, the cargo fire scenario shall be capable of initiation only by an instructor from a local control pendent located outside the fuselage mock-up.

(3) The fireplace shall be designed and constructed to respond to water spray from either a direct hose attack or as applied by a penetrating nozzle through a skin penetration area.

(4) A means shall be provided to ensure that the cargo compartment fire will grow at the predetermined rate and to the predetermined flame

height in the compartment. The fire shall cover approximately 1/2 of the interior of the cargo area in flames when the maximum flame height setting has been selected. At maximum flame height, fire shall reach the ceiling of the compartment.

(5) Sensors within the fireplace shall provide feedback to the control system. Based upon the predetermined settings of the extinguishing difficulty, the fire and/or smoke shall respond to proper agent application by receding in a realistic manner and eventually extinguish.

(6) If sensors within the fireplace detect that the application of water is stopped too early (based on the preselected soak time), the fire shall be permitted to rekindle.

124. to 129. RESERVED.

Section 8. COMMUNICATIONS SYSTEMS.

130. General Design Criteria. The overall design objective is to provide a communications system that will fulfill the command and control needs of the system operator, a safety officer, and one or more instructors for a simple, reliable means of communicating during system operation.

131. Performance Criteria. The functional objective is to provide a system that meets the overall design objective and is compatible with existing local communication systems. The purchaser should clearly define the local requirements for this communication system in their request for bids.

132. Radio Interference. Radio suppression of the MAT electrical system interference shall be in accordance with ***SAE*** J 551, ***Standard on Performance Levels and Methods of Measurements of Electromagnetic Radiation from Vehicles and Devices*** (20 - 1000 ***MHz),*** or an equivalent radio interference suppression standard.

133. to 139. RESERVED.

Section 9. OPERATOR MANUALS, GUIDANCE, AND TRAINING.

140. Operator Manuals, Technical Service, and Performance Documentation. The MAT documentation package shall include six copies each of an Operators Manual, a Parts Manual, and the Maintenance/Service Manual applicable to the specific MAT. All Original Equipment Manufacturer (OEM) documentation related to major components and subsystems shall be included. The documentation package shall also include one signed copy of each certification and each test report required by Section 11, Quality Assurance. These documents shall be packaged in a manner suitable for filing.

a. **Operator's Manual.** The Operator's Manual shall include all information required for the safe and efficient operation of the control system, the electrical power supply, the propane supply, and any special attachments or auxiliary equipment associated with the set-up, calibration, operation, break-down, and repackaging of the MAT for transport. The manual shall at least:

(1) Cover the procedures required to make the MAT operational upon its arrival at a training site.

(2) Give a general description of and step-by-step instructions for the operation of each fireplace.

(3) Provide checklists for the daily maintenance inspections, mission readiness checks, and any safety system calibrations that the operator is expected to perform prior to each new training day.

(4) Provide schedules for required calibrations, preventive maintenance, and required periodic maintenance.

(5) Provide a recommended spare parts list.

b. **The Parts Manual.** The Parts Manual shall include illustrations and exploded views, as

needed, to properly identify all parts, assemblies, subassemblies, and special equipment. The parts list shall indicate the quantity of each item required in the MAT. The manual shall contain an alphabetical and a numerical parts list in addition to a table of contents. It shall also contain an appendix listing the name and phone number for at least one source of all purchased parts.

(1) All components of assemblies shown in illustrations or exploded views shall be identified by reference numbers which correspond to the reference numbers in the parts lists.

(2) All purchased parts shall be cross-referenced with the OEM's name and part number.

141. Name Plates and Instruction Plates.

a. All nameplates shall be made of a material which is not degraded by weathering or exposure to water, heat, or fireftghting agents. The information may be engraved, stamped or etched on the plate. All plates shall be securely mounted in a conspicuous place on or near the item it identifies or for which it gives instructions.

b. Nameplates shall show make, model, serial number, and other such data as may be appropriate for positive item identification.

c. Instruction plates shall provide specific directions to be followed for safe, efficient operation, or servicing the MAT. These plates shall include specific warnings or cautions as may be necessary to protect operation and maintenance personnel from such hazards as high voltage, pressure and temperature, sharp edges, moving parts, or hazardous materials. These plates shall be so located and of sufficient size to be readily seen under normal operating and service conditions.

142. Training Course Requirements.

a. The functional objective of MAT Operator Training Course is to provide the designated operator(s) with the skills and knowledge needed to perform the manufacturer's recommended inspections, calibrations, and preventive maintenance and to ensure that the operator is qualified to operate the MAT in a consistent, efficient, and safe manner.

b. The training course shall include at least 40 hours (over 5 days) of combined class room and hands-on instruction on the use of the MAT and shall cover at least the following topics:

(1) A functional description of the MAT control system, the electrical power supply, and the propane fuel supply.

(2) The theory of the MAT operation.

(3) Detailed operational procedures, including the hands-on operation, of each fireplace.

(4) Detailed procedures for performing all required calibrations.

(5) Frequency and procedures for all operator required maintenance.

(6) Set-up, break-down and repackaging procedures.

143. Operator Performance Criteria. To receive a qualified operator's certificate, each trainee must be present for and complete 100% of the specified training course, pass a written review/test covering the safety critical elements (to be identified by the training provider) of the MAT operation, and demonstrate an ability to properly and independently operate each of the fire training scenarios.

144. to 149. RESERVED.

Section 10. MOBILE ARFF TRAINER TRANSPORTABILITY.

150. General Design Criteria.

a. The overall design objective is to provide a training device that can simulate the specified aircraft fires and can be transported from airport to airport or to any other suitable (accessible) location within a given geographic region.

NOTE: ***The specific, intended area of operation should be clearly defined by the purchaser in the request for bids. The purchaser should also***

determine whether or not there are any restricted bridges, tunnels, or any other traffic restrictions in the area where the MAT would be prohibited or whether, the MAT will require unique design or packaging to ensure that it can be moved throughout the intended area of operation.

b. The functional objective of the MAT's transportability is to minimize the number of person-hours and specialized equipment or tools required to set up or to disassemble and re-pack the MAT. Safety considerations dictate that three operators are the minimum number of personnel needed to perform actual training. Hence, this would be a cost-effective design target for the set up and re-pack functions.

c. The packaging of all of the MAT subsystem components shall be designed and fabricated so that the equipment is packaged for transport in the same manner each time.

(1) The packaging material, methods, and the packed configuration of the MAT system shall be designed and manufactured for long use and durability.

(2) The packaging shall also be designed to protect the equipment from shock and vibration damage during over-the-road transportation.

(3) The construction materials selected and the fabrication methods used for the electrical and propane distribution subsystems shall be appropriate for a transportable device that will be disassembled and assembled numerous times over its useful life. Both the design and the functional objectives are to provide a MAT that is free of loose electrical system connections and propane system leaks.

d. The supplier shall completely describe in the training material (See Section 9 above) the recommended method for setting up the MAT when it arrives on site, breaking it down for transportation to another site, and transporting the MAT between sites.

151. Aircraft Fuselage Mock-up. The mock-up shall be designed to be transported over the interstate highway system and to meet US Department of Transportation (USDOT) guidelines for operation on the public highways without special wide-load or hazardous materials permits.

a. The mock-up may be designed with trailer components such as hitches, axles(s), brakes, lights, and support jacks incorporated into the mock-up, or it may be designed for deployment from a standard flatbed trailer.

b. Regardless of the method selected, the trailer shall not require a special tractor or unique hitch arrangements, i.e., the type of hitch, brake, and lighting connections provided shall be those in common use in the commercial trucking industry.

152. Electrical Power Supply. The power generation subsystem shall be designed so that it either packs into the mock-up trailer or onto a separate trailer dedicated for ancillary equipment. Permanent mounting on a dedicated equipment trailer is' an acceptable means of providing transportability.

153. Electrical Cabling, Connectors, and Wiiing. The electrical cabling and connectors shall be designed either to pack into the fuselage trailer or onto a separate, dedicated ancillary equipment trailer. Cables shall be stored on reels and connectors shall have protective covers.

154. Fuel-spill Burn Area. The fuel-spill burn area and its support equipment shall be designed to either park into the fuselage trailer or onto a separate, dedicated ancillary equipment trailer.

155. Propane Fuel' Supply. The fuel supply subsystem, when being transported as part of the MAT system, shall be designed to be shipped either as part of the fuselage trailer or on a separate dedicated ancillary equipment trailer.

a. The manufacturer will also provide, as part of the required training material, a description of the procedure for having the propane subsystem purged and sealed for transport and inspected and filled once deployed.

b. The manufacturer shall include, as part of the subsystem documentation, a description of any licenses or permits required for interstate transport of the MAT.

NOTE: ***Purchaser should clearly define the intended area of operation in the request for bids.***

156. Propane Hoses, Piping, Fittings, and Couplings. The propane hoses, piping, fittings, and couplings shall be designed either to pack into the fuselage trailer or onto a separate dedicated ancillary equipment trailer. Hoses shall be stored on reels, piping and fittings in dedicated cases or boxes, and couplings shall be provided with protective covers.

157. Simulator Control Center. The control center shall be designed to ship either as part of the fuselage trailer or on a separate dedicated ancillary equipment trailer. Permanent mounting on a dedicated equipment trailer with the electrical power supply is an acceptable means of providing transportability for either or both items. Permanently co-mounting the control center and the electrical power supply with the propane supply is not acceptable.

a: The whole control center is to be designed so that the operator control system, the communications system, specialized maintenance tools, spare parts and materials, the operator's manuals, books, and the paperwork associated with the operation of the MAT. can be stored in the control center when the system is in transit.

b. The control center and the interior furnishings shall be designed and manufactured to protect the equipment and material stored inside when the trainer is in transit and to limit damage to the interior surfaces of the control center.

158. to 159. RESERVED.

Section 11. QUALITY ASSURANCE AND CRITERIA FOR MAT ACCEPTANCE.

160. Manufacturer's Certification. The MAT manufacturer shall comply with this requirement by providing a written certification that the item(s) or function(s) required by the sections marked with a "C" in Table 4-4 have been provided and that they comply with this guide specification or the manufacturer's own advertised specification, whichever is more demanding.

161. Functional Tests. The MAT manufacturer shall conduct functional tests on each of the subsystems marked with a "T" in Table 4-4. These tests may be conducted either during the construction/installation of the subsystem or as part of a final integrated systems operational check-out. The results of these tests shall be recorded and signed by the test manager. A copy of the signed test report(s) shall be made part of the MAT documentation package.

162. Acceptance Demonstrations. The MAT manufacturer shall comply with this requirement by conducting a demonstration of the MAT that will verify that each of the items or performance criteria marked with a "D" in Table 4-4 have been provided. These acceptance demonstrations may be conducted at the manufacturer's facility, at the purchaser's airport, or at another mutually acceptable demonstration site.

TABLE 4-4. Quality Assurance Requirements

Section/ Para. No.	Topic	Type of Assurance		Date "D" Completed	Action Required by the Manufacturer
Section 1	**MAT System Safety**	C			C = The manufacturer shall certify in writing that the items or functions have been provided and that they comply with the general design criteria and that they meet performance requirements of the applicable Section, paragraph, and subparagraph in this guide specification and any referenced consensus standards or with the manufacturers own advertised specification, whichever is more demanding. The written certification(s) shall be provided as part of the deliverable documentation. T = The manufacturer shah conduct a performance test for each function as part of the manufacturing process and shah provide a signed test report or memo as part of the deliverable documentation. D = The function of each item shall be demonstrated to the purchaser. These performance demonstrations shall be part of the acceptance inspection process.. The ability to meet the specified performance criteria shall be witnessed by at least one purchaser's authorized representative. D* = This requirement will be considered fulfilled at the successful completion of a training session provided for the initial group of the purchaser's designated system operating personnel. D** = This acceptance test function will require the demonstration of at least one complete cycle of breakdown, packaging, over-the-road transportation, unpacking/setup and operation of the MAT. Origin and destination sites should be mutually agreed to by the purchaser and the manufacturer.
61	Combustion Air Augmentation		T D		
62	Emergency Shutdown		T D		
63	Extinguishing Agent Detection		T D		
64	Fail-safe Propane Control Valves		T D		
65	Internal Air Temp. Monitonng & Control		T D		
66	Hardware Malfunction		T D		
67	Pilot Flame Monitoring		T D		
68	Pre-ventilation / Ventilation		T D		
69	Propane Level Monitoring		T D		
Section 2	**Aircraft Mock-up**	C			
Section 3	**Fuel Spill Burn Area**	C			
81	Dimensions		D		
82	Performance Criteria		T D		
Section 4	**The MAT Control Center**	C			
91	Performance Criteria		T D		
Section 5	**Fuel System Requirements**	C			
102.a.	Performance Criteria - Supply		T D		
Section 6	**Electrical System requirements**	C			
112.a.	Performance Criteria - Electrical Power Supply		T D		
Section 7	**Integrated Systems Requirements**	C			
122	Exterior Aircraft Fire Incident Scenarios - ALL		T D		
123	Interior aircraft Fire Scenarios - ALL		T D		
Section 8	**Communications Systems**	C			
131	Performance Criteria		D		
132	Radio Interference		T		
Section 9	**Op'r Manuals, Guidance and Training**	C			
140	Op'r and Technical Service Documentation				
a	*The Operators Manual*		D		
b	*The Parts Manual*		D		
141	Name Plates and Instruction Plates		D		
142	Training Course Requirements		D*		
Section 10	**Mobile ARFF Trainer Transportability**	C			
150	General Design Criteria		D		
151	Aii Fuselage Mock-up		D**		